ALABAMA SUPPLEMENTS TO THE

NATIONAL ENGINEERING FIELD HANDBOOK

CHAPTER 14. WATER MANAGEMENT (DRAINAGE)

Contents

FIGURES

650.1412(d)

Design of open drains

Engineering notes for surface drainage are shown in Figure AL14-1.

DRAINAGE

A. Engineering Surveys for Design and Construction Layout
(SCS-ENG-191 - Engineering Field Book)

1. Complete title page (SCS-ENG-28) with sketch of practice location.
2. Show at beginning of survey: farmer's name, purpose of survey, name of practice, party members, duties, and date.
3. Record complete design data in accordance with recommended format.
4. Describe benchmark and close survey within allowable limits.
5. Soil borings. (If needed.)
6. Include in surveys: cross sections, pipe elevations, waterline, and stakes for construction.
7. Design approval and date.
8. Statement on wetland types.

B. Construction and Performance Check
(SCS-ENG-191 - Engineering Field Book)

1. Profile and grade of completed ditch.
2. Survey cross-sections showing side slopes, depth, bottom width, berm width, and spoil shaping.
3. Supporting statements:
   a. placement of spoil.
   b. condition of clearing disposal.
   c. condition of vegetation.
   d. general remarks about construction meeting plans and specifications along with signature, title, and dated.

U.S. DEPT. OF AGRICULTURE **AL-ENG-8**
Natural Resources Conservation Service **Rev. 9/99**

DRAINAGE DITCH DESIGN

DOES NOT INCLUDE WETLANDS TYPE 3-20

JOB CLASS I **DITCH NO.** 1

DRAINAGE AREA = 600 **AC. TYPE DITCH** Pan

SOIL TYPE SC-CL **ALLOW. VEL.** 3.0 **FT/SEC.**

SIDE SLOPES = 4 **:1 GRADE =** 0.0010 **FT/FT.**

BOT. WIDTH = 6 **FT. Q NEEDED =** 24 **CFS**

DEPTH = 1.75 **FT. DESIGNED VEL. =** 1.1 **FT/SEC.**

AREA = 22.75 **SQ.FT. Q DESIGNED =** 26 **CFS**

QUANTITY = 1,213 **YDS. CLEARING =** 1.2 **AC.**

VEGETATION Fescue and Clover

DESIGNED BY T. Edwards **CHECKED BY** R. Ray

Figure AL14-1. Survey, Design, and Construction - Surface Drainage. (Sheet 1 of 4)

Station	B. S.	H. I.	F. S. or Grade Rod		Planned Elevation
TBM #1	*4.22*	*104.22*			*100.00*
Outlet (bottom)			*+8.4*		*95.8*
0+00			*+8.4*		*95.8*
1+00			*+7.8*		*96.4*
2+00			*+7.7*		*96.5*
3+00			*+7.6*		*96.6*
4+00			*+7.5*		*96.7*

J.T. Jones — *T. Edwards*

Ditch No. 1 — *R. Ray*

Design - Const. Layout — *11/15/00*

60d nail near ground in west side 18" cottonwood in N. E. corner fence.

Excavation (cu. yd./ft.)

1.89	*5.6* / *C=2.8 - 14.2'*	*5.5* / *C=2.5'*	*5.4* / *C=3.0 - 15.0'*
1.29		*5.5* / *C=2.3'*	
1.39	*5.3* / *C=2.4 - 12.6'*	*5.3* / *C=2.4'*	*5.3* / *C=2.4 - 12.6'*
1.48		*5.1* / *C=2.5'*	
1.48	*5.3* / *C=2.4 - 13.0'*	*5.3* / *C=2.4'*	*5.3* / *C=2.4 - 12.6'*

Figure AL14-1. Survey Design and Construction Notes - Surface Drainage.

Station	B. S.	H. I.	F. S. or Grade Rod		Planned Elevation
		104.22			
5+00			+7.4		96.8
6+00			+7.3		96.9
7+00			+7.2		97.0
8+00			+7.1		97.1
TBM #1			4.22		100.00
				Check O.K. T.E.	

J.T. Jones — T. Edwards

Ditch No. 1 — R. Ray

Design - Const. Layout — 11/15/00

1.58	5.6 C=2.8 - 14.2'	4.8 C=2.6'	5.4 C=3.0 - 15.0'
1.68		4.6 C=2.7'	
1.68	4.6 C=2.6 - 13.4'	4.5 C=2.7'	4.5 C=2.7 - 13.8'
1.21		4.9 C=2.2'	

13.68 x 100 = 1368 yds.

Less correction for end stations:

Sta. 0+00 - 1.89

Sta. 8+00 - 1.21

3.10 / 2 = 1.55 x 100 = 155 yds.

Total = 1368 - 155 = 1213 yds.

Figure AL14-1. Survey Design and Construction Notes - Surface Drainage.

Station	B. S.	H. I.	F. S. or Grade Rod	Elev. or Planned elev.	
		104.22			
TBM #1	5.50	105.5		100.00	
0+00			+9.7	95.8	
1+00			+9.1	96.4	
2+00			+9.0	96.5	
3+00			+8.9	96.7	
4+00			+8.8	96.8	
5+00			+8.7	96.8	
6+00			+8.6	96.9	
7+00			+8.5	97.0	
8+00			+8.4	97.1	
TBM #1			5.50	100.00	100.00
				Error 0.00	T.E.

J.T. Jones — T. Edwards

Ditch No. 1 — R. Ray

Design - Const. Layout — 11/15/00

60d nail near ground in west side of 18" cottonwood in N.E. corner of fence.

9.7

6.9/13.0' 9.3/3.5' 9.2/0 9.2/3.0' 6.8/14.0'

9.1

9.0

8.9

8.8

8.7

5.7/15.0' 8.6/3.0' 8.6/0 8.6/3.0' 5.7/16.0'

8.3

R.O.W. clearing and debris disposal O.K. Spoil spread satisfactorily. Ditch side slope banks and spoil area seeded to fescue grass and clover. Construction meets plans and specifications.

T. Edwards, Cons. Tech. 12/5/00

Figure AL14-1. Survey Design and Construction Notes - Surface Drainage. (Sheet 4 of 4)

650.1423(h)

Field Drainage System Design

Engineering notes for subsurface drainage are shown in Figure AL14-2.

SUBSURFACE DRAINAGE

A. Engineering Surveys for Design and Construction Layout
(SCS-ENG-191 - Engineering Field Book)

1. Complete title page (SCS-ENG-28) with sketch of practice location.
2. Show at beginning of survey: farmer's name, purpose of survey, name of practice, party members, duties, and date.
3. Record complete design data and bill of materials in accordance with recommended format.
4. Describe benchmark and close survey within allowable limits.
5. Soil borings. (If needed.)
6. Design approval and date.

B. Construction and Performance Check
(SCS-ENG-191 - Engineering Field Book)

1. Profile showing grade elevations of open trench; invert of inlets, outlets, etc.
2. Supporting statements; quantities of materials, kind of pipes, vegetation, and remarks about construction meeting plans and specifications with signature, title, and date.

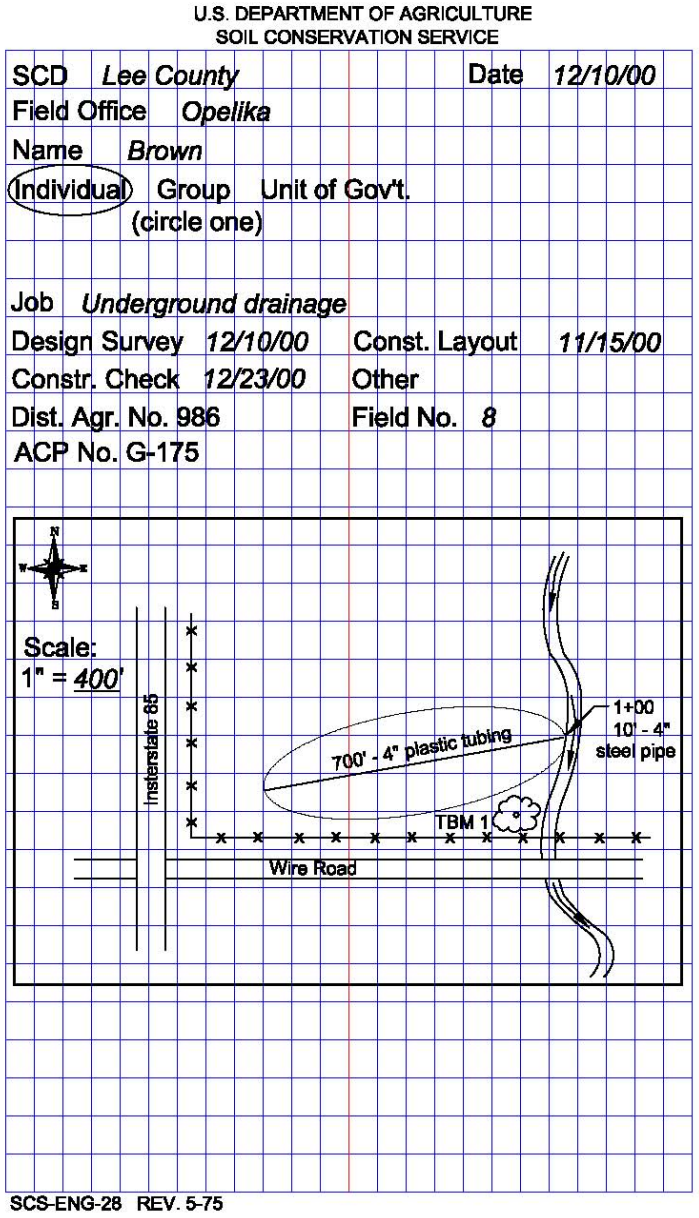


Figure AL14-2. Survey, Design and Construction Notes - Subsurface Drainage. (Sheet 1 of 5)

U.S. Dept. of Agriculture
Natural Resources Conservation Service

AL-ENG-18A
Rev. 9/99

SUBSURFACE TILE DRAIN DESIGN

DOES NOT INCLUDE WETLANDS TYPE 3-20 ☐

JOB CLASS I LAND USE ROW CROPS

SOIL NAME MYATT UNIFIED CLASS. SM - SC

DRAINAGE COEF. ½ " INFLOW RATE PER 1000 FT. ----

OUTLET PROTECTION 10 ' - RIGID PIPE W/A.GUARD

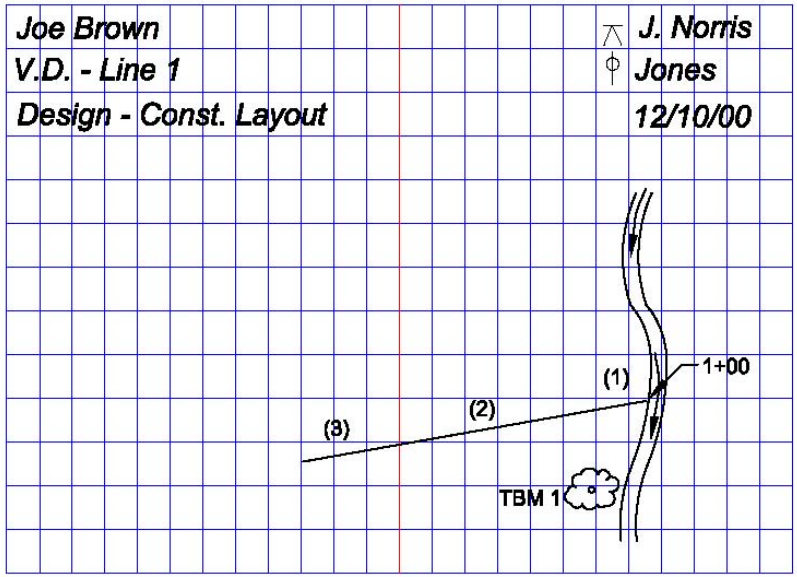
FILTER REQ'D YES TYPE DRAIN GUARD OR EQ.

FILTER DEPTH ------ IN. FILTER LENGTH 790 FT.

DESIGNED BY J.N. CHECKED BY M.F.H.

STA. LENGTH	DR. AREA OF COEF.	GRADE	TILE SIZE	REQ. CFS	CAPACITY SUM CFS
1 + 00 8 + 00	5 ac - ½ in.	0.009	4 "	0.11	0.11

MATERIALS:



LOCATION SKETCH

PHOTOGRAPH NO. HN-20-75

DATE: 12-10-00
BY J.N.

SOIL BORINGS

HOLES	1	2	3	4	5	6	7
DEPTH	2 + 00	5 + 00	7 + 00				
0 - 1'	SM	SP	SP				
1 - 2'	SM	SP	SM				
3 - 4'	SM	SM	SM				
4 - 5'	CL	CL	CL				

REMARKS:

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BILL OF MATERIALS
10' - 4" Steel Pipe
700' - 4" Plastic Tubing with Drain Guard
1 - Animal Guard

210-VI-NEM, Amend. AL6, October 2008)

AL14-70(3)

Figure AL14-2. Survey, Design, and Construction.

Station	B. S.	H. I.	Grade Rod	Planned Elev.	
TBM #1	*7.12*	*107.12*		*100.00*	
1+00			*+14.0*	*93.1*	
2+00			*+13.1*	*94.0*	
3+00			*+12.2*	*94.9*	
4+00			*+11.3*	*95.8*	
5+00			*+10.4*	*96.7*	
6+00			*+9.5*	*97.6*	
7+00			*+8.6*	*98.5*	
8+00			*+7.7*	*99.5*	
TBM #1			*7.12*	*100.00*	*100.00*
				Check O.K. J.N.	

Joe Brown — *Norris*

Subsurface Drain, Line 1 — *Jones*

Design - Const. Layout — *12/10/00*

Nail in base E. side 18" sweetgum approx. 200' S. sta. 1+00

Water surface at outlet	*16.0*	
		HUB
Begin 10" rigid pipe	*11.0*	*10.2/C-3.8*
	10.0	
	8.9	*8.7/C-3.5*
	8.0	
	7.2	*7.0/C-3.4*
	6.1	
	4.2	*4.1/C-4.5*
	4.2	

Figure AL14-2. Survey Design and Construction Notes - Subsurface Drainage.

Station	B. S.	H. I.	Grade Rod	Planned Elev.	
TBM #1	*4.53*	*104.53*		*100.00*	
1+00			*+11.4*	*93.1*	
2+00			*+10.5*	*94.0*	
3+00			*+9.6*	*94.9*	
4+00			*+8.7*	*95.8*	
5+00			*+7.8*	*96.7*	
6+00			*+6.9*	*97.6*	
7+00			*+6.0*	*98.5*	
8+00			*+4.1*	*99.4*	
TBM #1			*+4.53*	*100.00*	*100.00*
				Check O.K. J.N.	

Joe Brown — *Norris*

Subsurface Drain, Line 1 — *Jones*

Const. Check Survey — *12/23/00*

See description, Page 12

Pipe O.D. (Ft.)

0.4	*11.0*	*Note: Rod readings taken on top of installed 4" dia. plastic pipe before trench was backfilled. 12/23/00*
0.4	*10.1*	
0.4	*9.2*	
0.4	*8.3*	
0.4	*7.3*	
0.4	*6.5*	
0.4	*5.6*	
0.4	*3.8*	

690' - 4" ADS plastic pipe w/ drain guard.

10' - 4" steel pipe

1 - Animal guard

Trench backfilled - Seeded to fescue.

Meets plans and specs.

J. Norris, Cons. Tech. 12/26/00

Figure AL14-2. Survey Design and Construction Notes - Subsurface Drainage.

Station	B. S.	H. I.	Grade Rod	Planned Elev.	

NOTE:

A complete construction check survey will be made and recorded when:

1. *The pipe is installed by backhoe.*
2. *Hubs are not set during construction.*
3. *Hubs are destroyed during construction.*
4. *Problems are encountered in constructing the trench to grade.*
5. *Backfill is not made daily behind laying of pipe or tubing.*

Joe Brown *J. Norris*

Subsurface Drain *12/18/00*

Const. Check Survey

The contractor used a trenching machine with laser beam control to install the drainage tubing. The farmer is placing the gravel filter around the corrugated plastic tubing and has backfilled the trench immediately.

Hand level checks by the contractor and my checks show the drain is on grade.

6/18/00
J.R. Norris
Conservation Technician

Contractor finished the job. Landowner verified the materials to be A.D.S. plastic tubing with the quantity of 200' - 4", 375' - 5" and 550' - 6" and 58 tons of gravel. The system is draining good, trench backfilled with ample cover. Ten feet of corrugated metal outlet pipe with hinged animal guard and post in place. Construction meets plans and specifications.

6/21/00
J.R. Norris
Conservation Technician

Figure AL14-2. Survey Design and Construction Notes - Subsurface Drainage. (Sheet 5 of 5)